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PRELIMINARY REPORT ON LOWER HART-JAUNE RIVER AREA, SAGUENAY COUNTY

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PRELIMINARY REPORT

ON

LOWER HART-JAUNE RIVER AREA

SAGUENAY COUNTY

BY

LESLIE KISH

QUEBEC
1962

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INTRODUCTION

The Lower-Hart Jaune River area is bounded by latitudes 51°30' and 51°45' and by longitudes 68°15' and 68°30'. It covers approximately 185 square miles included in parts of Berthelet and Brien townships and in unsurveyed ground. Its centre is some 20 miles south of Gagnon and 170 miles north of Baie-Comeau. The northeastern part of Manicouagan lake crosses the southern part of the area.

This area was mapped by the writer in 1961 in conjunction with a reconnaissance survey by Bérard (1962) of the Manicouagan and Mouchalagane lakes. Both surveys, but the latter in particular, were designed to gather geological information over ground that would be flooded by the higher water caused by Manicouagan-dam-5, now being built.

Floatplanes provide the easiest means of transportation to the area. The nearest commercial base is at Louise lake, about 80 miles to the south and near the site of Manicouagan-dam-5. The canoe route via Manicouagan river and lake from the end of the private road that connects Manicouagan-dam-5 with the St. Lawrence shore can also be used to reach the area.

Topographically, the area may be divided into three parts relative to Manicouagan lake. South and west of the lake, Post-Ordovician igneous rocks form a plateau-like terrain. North of the lake, where gneisses and gabbros are the underlying rocks, subdued hills are characteristic and many are aligned parallel to the structure. East of the lake, where the underlying rocks are mainly gabbro, the surface is more rugged. This last division includes Mont Manic, about 2,900 feet above the sea and the highest point in the area. Manicouagan lake is 645 feet above sea-level, so that the maximum relief is about 2,250 feet. In general, the surface of the area rises steeply from the lake to 1,500 feet and more above sea-level.

All rivers and streams flow directly into Manicouagan lake and eventually to the St. Lawrence through Manicouagan river. The structure of the bedrock has influenced stream courses, particularly in the uplands where the cover of unconsolidated material is thin.

Glacial debris covers a large part of the area, and proglacial terraces lie along the southwestern shore of Manicouagan lake, as well as along parts of the valleys of the larger rivers. The continental ice sheet moved S.20°E., the direction being indicated by striae, fluted surfaces easily recognized on aerial photographs, abundant erratics of local origin, and some quartz-specularite rock presumably from the north.

GENERAL GEOLOGY

The area includes three different ages of rocks: Precambrian, Ordovician and Post-Ordovician. Precambrian gneisses with a little anorthositic rock occupy the northern two-thirds of the area and foliated gabbro occupies the southeastern part. Post-Ordovician, microcrystalline, fine- and medium-grained igneous rocks that may be lavas are widespread west and southwest of Manicouagan lake. Middle Ordovician limestones occur in small and widely scattered areas on the west and southern shore of the lake and up to 1½ miles inland.

The most abundant gneisses of the area are syenitic and granitic. Some gneisses, as indicated by their intimate association with crystalline limestone and quartzite, are probably altered sedimentary rocks; some are certainly formed by injection of syenitic and granitic material into older rocks; and still others are of entirely igneous origin. Most of the gneisses are younger than the anorthosite and anorthositic gabbro.

Table of Formations

PLEISTOCENE	Sand, gravel, boulders, till, stratified drift
Unconformity	
POST-ORDOVICIAN	Medium-grained, massive igneous rocks. Microcrystalline and fine-grained igneous rocks, massive and vesicular, with or without inclusions.
ORDOVICIAN	Limestones
Unconformity	
PRECAMBRIAN	Pegmatites Pink and red granite, massive and gneissic. Basic intrusive rocks: foliated gabbro, anorthositic gabbro, and anorthosite. Medium-grained granitic and syenitic gneisses Medium- and coarse-grained hornblende-plagioclase and hornblende-plagioclase-garnet-gneiss; amphibolite, quartzite, crystalline limestone Medium- and fine-grained layered gneiss, mixed gneiss.

Gneisses

More than half or the area is underlain by diverse kinds of gneisses. They have been subdivided on the basis of their mineral content, and the terms used have no genetic implication. High-grade metamorphism and deformation have resulted in complex relationships and, in many places, the geological boundaries between different groups are transitional.

In the north and northwest, the characteristic rocks are medium and fine grained, light coloured, highly feldspathic and well foliated. These rocks may be distinguished as granitic or syenitic in the field, although they are too closely associated to be separated on the scale at which the area was mapped. Most of these rocks are paragneisses, and the differences in mineral composition are related to differences in composition of the original sediments. However, part of the granitic gneisses is probably injected material.

Layered gneisses. Along the north shore of Manicouagan lake and north of Hart-Jaune river, the area is underlain by gneisses in which light and dark layers alternate. The width of the layers varies from a few millimetres to several feet. Hornblende is the common mafic mineral of the dark bands with biotite less abundant. Porphyroblasts of garnet and feldspar as much as 10 mm. in diameter are present in both light and dark layers. The regular layering in many places gives way to wrinkles. At one locality a series of thin layers of feldspathic quartzite occurs in the layered gneisses.

Mixed gneisses, which are particularly common along the north shore of Manicouagan lake, are layered gneisses into which granitic material has been introduced with an irregular pattern. The ratio between the darker, layered rock and the lighter-coloured granitic rock is variable but in some places the granitic unit is large enough to be mapped separately. In other places the dark gneisses form continuous units, and the injecting material appears only as bands or veins. The contacts between older gneisses and injected material are sharp, and, in many places, the shape of the enclosed blocks shows that they are fragments. The dark fractions are biotite-hornblende-feldspar and biotite-feldspar-quartz gneisses. Some biotite-rich varieties contain kyanite, which suggests that the containing rocks are paragneisses. In these mixed gneisses the dark layers contain garnet and, in a few places, graphite.

Hornblende-plagioclase and hornblende-plagioclase-garnet gneisses

Most of these grey and dark grey rocks occur as units several miles long on both sides of the lower course of the Hart-Jaune river and as small scattered masses associated with the layered gneisses. They are composed chiefly of plagioclase, with possibly some potassic feldspar, and hornblende. Garnet forms from 0-20% of the rock. Varieties with pyroxene and biotite were found. Chlorite, epidote, and pyrite occur in places. The texture and composition vary locally and the transition from the syenitic gneisses to these hornblende-plagioclase gneisses is continuous and is marked by a change to higher mafic and lower potassic feldspar content.

The common grey gneisses along Hart-Jaune river are medium grained and low in garnet and carry chlorite and epidote in the fracture zones.

North of Hart-Jaune river the hornblende-plagioclase gneisses are coarser grained than those along the river, contain 15-20% garnet, and are associated with anorthositic gabbro and anorthosite. The contact between gneisses and anorthositic gabbro is transitional; the transitional rock consists of white plagioclase and hornblende or pyroxene in grains up to 8 mm. in diameter, some of which are enclosed by corona-garnet. Toward the anorthosite the colour of the plagioclase changes from white to bluish grey.

Thin bands of crystalline limestone and quartzite are associated with the pyroxene-hornblende-plagioclase gneisses west of Hart-Jaune river.

Amphibolite

In a few places, layers of amphibolite 3 inches to 2 feet thick occur in the hornblende-plagioclase gneisses. The layers are probably completely recrystallized basic dykes. The hornblende of the amphibolite is usually medium and fine grained, but in some thin layers crystals up to 12 mm. occur. The plagioclase content is very low.

Quartzite

A few small bands of quartzite, not shown on the accompanying map, are associated with layered and hornblende-plagioclase gneisses. In the layered gneisses of the central part of the area, thin quartzite layers parallel the foliation and form a series of low ridges. The medium-grained, glassy quartzite is dotted with white anhedral feldspar grains.

Near the shore of a bay west of Hart-Jaune river, medium-grained, bluish quartzite has been plasticly deformed and folded with the hornblende-plagioclase gneisses.

Crystalline limestones

In two places, layers of crystalline limestone occur and are conformable with the gneisses. This limestone is white to pink and contains green pyroxene, mica, and a little pyrite.

Granitic gneisses. These rocks are commonly pink and consist of 70-85% feldspar and 5-15% quartz with some hornblende, biotite, and garnet. In places, a small amount of pyroxene or graphite is present. Two varieties are common: in one, the foliation is well developed and is shown by closely spaced quartz stringers 1 to 2 mm. thick; in the other, the foliation is not so well marked, and garnet forms aggregates with mafic minerals to give a speckled aspect to the rock.

Syenitic gneisses. These are mostly grey rocks with little or no quartz, 60-75% feldspar, and a higher tenor of mafic minerals than the granitic gneisses. Pyroxene and hornblende are common, but biotite and garnet are not abundant. Some accessory iron ore minerals are present. The well developed foliation is marked by mafic layers 2 to 3 mm. thick.

Gabbro, Anorthositic Gabbro and Anorthosite

Small, irregular bodies of massive anorthositic gabbros and anorthosites crop out north of Hart-Jaune river. Foliated gabbros occur in the southeast corner of the area and along the shores of Manicouagan lake.

The anorthositic gabbros and anorthosites are associated with hornblende-plagioclase gneisses, the contact rock being similar in mineral composition but not in texture to the gneisses. The anorthositic gabbros and anorthosites are coarse grained and dark and consist of blue-grey plagioclase with altered pyroxene and possibly olivine. The plagioclase tenor is from 50-90%. These rocks underlie the peaks in the area north of Hart-Jaune river.

Small lenses of ophitic gabbros occur in the northern part of the area. They are massive and are coarse grained and composed of clouded plagioclase, altered pyroxene, olivine, and corona-garnet.

The foliated gabbros in the southeast corner extend east and south beyond the area. These are medium-grained rocks composed mainly of white plagioclase and pyroxene. Hornblende, biotite, and garnet are minor constituents. The ratio of dark minerals to plagioclase is variable and, in places, the rock is anorthositic.

No intrusive contacts between foliated gabbros and gneisses were seen although the two are adjacent along the northern part of the west shore of Manicouagan lake. Here, a series of thin brecciated zones indicates a fault. The foliation of both gneisses and gabbros is parallel to the fault, which strikes S.60°E. and dips 75°SW.

Pink and Red Granites

Small masses of pink, gneissic granite are present in the mixed gneisses on the northern shore of Manicouagan lake. The foliation conforms to that of the surrounding gneisses. Some of the pink, granitic gneisses farther north may be related to these foliated granites.

Massive, red granites cut the foliated gabbros. Most of them are in bodies too small to show on the accompanying map. The abundant minerals are red feldspar and bluish quartz.

Pegmatite

Pegmatite dykes or sills cut all the other Precambrian rocks of the area. They are made up of a very coarse-grained rock composed of pink, potassic feldspar, white plagioclase, quartz, and biotite. Pegmatites along the north shore of Manicouagan lake contain 12-15% magnetite. Coarse-grained graphic granites outcrop in the northern part of the area.

Ordovician Limestones

Small patches of light grey to beige, distorted limestones with Ordovician fossils are exposed along the west shore of Manicouagan lake. Parts of the limestones are a recrystallized, fine-grained, clear calcite. At two places along the shore of the lake the limestone was seen to rest on crumpled, mixed gneisses. The basal part of the limestone consists of well rounded and well sorted quartz sand in a red shaly matrix.

Near the western boundary of the area and 1.5 miles south of Manicouagan lake, a large inclusion (80' x 200') of limestone in the lava is cut by vesicular microcrystalline igneous material. Although no fossils were seen in the block, the limestone has the same physical properties as the limestones found along the shore of Manicouagan lake and is believed to be the same.

Post-Ordovician Igneous Rocks

These rocks occur in the area west of Manicouagan lake and are a part of the igneous complex that extends to the west and southwest. They are well exposed in cliffs parallel to the shore of Manicouagan lake. A marginal belt along or near the shore consists of very fine-grained, massive, vesicular, grey and red-brown rocks generally with inclusions of various sizes and compositions.

Away from the shore, the rock is medium-grained, grey or reddish, massive and devoid of inclusions. Phenocrysts, probably pyroxene, are up to 5 mm. long.

Tuffs, pillows, or evidence of successive flows was not found within this section of the igneous complex. However, the physical properties of the hand specimens give the impression that the rocks were lavas.

The exact age of these rocks is not known, but they are younger than the Ordovician limestones and the youngest consolidated rocks of the area.

STRUCTURAL GEOLOGY

The structural relationships of the area are complex, and interpretation is difficult because of metamorphism and lack of horizon markers. Most evidence of folds and faults was observed within the gneisses. Joints and shear zones occur in the gabbros,

and joints are the only prominent structural feature of the Post-Ordovician igneous rocks.

Folds

The gneisses in the north-northwestern part of the area are in isoclinal folds whose axial planes strike north-northeast. Most of the dips are 35° to 55° east.

Tight isoclinal folds were noted along the north shore of Manicouagan lake west of Hart-Jaune river. In many cases, the sequences of similar bands on the horizontal surface may be the result of folding. The axial planes of the folds strike S.70°E. and dip 65-75°N.

Faults, Fractures, Shears

A fault is indicated along the Hart-Jaune river by slickensides, small-scale displacement, and crumpling. Chlorite is common on the sheared, shiny surfaces, and epidote occurs as thin, irregular veinlets.

West of Hart-Jaune river another fault is suggested by apparent termination of the formations and straight, high cliffs.

Thin shear zones trending parallel to some of the joint directions are common in the gabbros to the southeast. They are filled with dark grey, cherty material. Some of the fractures along the shore of Manicouagan lake are filled with medium- to coarse-grained red grenite.

Foliation

A general foliation pattern in the northern gneisses trends N.25-35°E.; the general dip is eastward. The gneisses near Hart-Jaune river strike S.70-80°E. and dip 65-75° north. The foliated gabbros strike N.35-45°E. and dip 65° southeast in general.

Joints

Joints are common in the southern half of the area. The joints in the Post-Ordovician igneous rocks have the same attitude as those in the foliated gabbros east of Manicouagan lake. Three sets are prominent and strike N.-NE., N.-NW. and W.-NW. Most of these joints are vertical or nearly so. In addition flat joints are common in the igneous rocks west of the lake. Along the shores of Manicouagan lake joints are at 1-5-inch intervals in the gabbros, and their attitude changes within short distances.

ECONOMIC GEOLOGY

The area has not been intensively prospected and no claims have been staked. Sulphides of iron are present in shears in the foliated gabbro, particularly in the southeast corner. Further work

toward the east and southeast may reveal the extent and measure of this mineralization. Garnet and magnetite are concentrated in the beach sand of the bay west of Hart-Jaune river.

Large quantities of sand and gravel are available in terraces along Manicouagan lake and the larger rivers.

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